BRIAN SMITH – CHAIR DAVID FAY FORREST HODGKINS PETER KELLY-JOSEPH ELLEN SACHS-LEICHER ASSOCIATE MEMBERS: STUDENT MEMBER: LIAISONS: OPEN OPEN KARA MINAR, SELECT BOARD SUSANMARY REDINGER, SCHOOL COMMITTEE SHARLENE CRONIN, CAPITAL PLANNING TBD, FINANCE COMMITTEE GUY HERMANN, PERMANENT BUILDING COMMITTEE

### Meeting Minutes 12/14/22

Attendees: B. Smith, D. Fay, F. Hodgkins, P. Kelly-Joseph, E. Sachs Leicher

Location: This Meeting was held virtually in accordance with Chapter 20 of the Acts of 2021, An Act Relative to Extending Certain COVID-19 Measures Adopted During the State of Emergency and signed into law on June 16, 2021 Zoom Meeting ID: 856 9026 1562

#### Admin 1. HEAC approved the minutes of 11/9/22 5-0 with comment.

1	Goal: Decarbonization Plan – Reduce Emissions	Lead: Brian	Support: Ellen
	Action	Status	Next Step
	1. Obtain DOER grant funds for consultant	Completed July 2021	NA
	2. Municipal Decarbonization plan – finalize plan by Nov 2022.	Initial review by stakeholders with review of climate plan complete	Perform another round of reviews with HEAC and stakeholders. Create implementation roadmap. 1. Waiting for John Snell implementation roadmap input. 2. Stakeholder meeting – Brian set up with Town/Schools. 3. Align with Climate Plan being finalized (SB 9/20) by end Sept. HCIC SB 9/20 meeting went well. The Climate Plan draft report is being released this week and then to be sent to the Select Board in Nov. David suggest that we have a focus on zero net energy buildings HEAC review Implementation Plan and provide comments by 11/16. Goal is to align with Climate plan. Goal to review final plan and identify steps to issue at Dec HEAC meeting. Climate Plan approved 12/6 by Select Board. Brian to take John Snell's input and review against Climate Plan. Ellen and Brian to engage with stakeholder committees on the Energy and Building modules on the implementation plan.
	3. Community Decarbonization plan – finalize by Nov 2022.	Initial review by key personnel complete	Perform detailed review by HEAC, HCIC and other community stakeholders. – 1. Brian have John Snell revise plan with HEAC comments. 2. Align with Climate Plan by end Sept. Goal to review final plan and identify steps to issue at Dec HEAC meeting. Climate Plan approved 12/6. Brian to take John Snell's input and review against Climate Plan.

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2	Goal: Buildings – Electrification Plan; Assessment / Energy Reduction Projects	Lead: Forrest	Support: Brian/David
	Action	Status	Next Step
	1. Develop a detailed long- range plan for strategic building electrification, with financial analysis, to upgrade municipal building heating systems.	Not started.	<ol> <li>Develop and issue RFP by Nov 2022.</li> <li>a. Brian ask John Snell about grant for RFP.</li> <li>b. Forrest ask DOER about Technical Assistance grant.</li> <li>c. Investigate MVP grant.</li> <li>Obtain funding and target plan by Sep 2023.</li> <li>We are working with NGRID to have an Electrification Assessment performed by B2Q (via NGRID) at no charge.</li> <li>KOM was held with B2Q and NGRID. The goal is to apply for a DOER technical assessment grant by the deadline of Nov 18. The focus will be to replace the heating system which is the biggest source of emissions.</li> <li>Building Electrification plan – goal to eliminate fossil fuels for space heating. Focus TBS, Town Hall and Public Safety building.</li> <li>Bromfield - site review by B2Q 11/15 9 am. Working on a proposed scope of work to apply for DOER technical assistance grant – next step to review the B2Q study output.</li> <li>Forrest arranged B2Q audit walk through of Bromfield. Draft report to NGRID in Dec 2022.</li> <li>Separate study is being arranged for Bromfield – suggest one RTU scheduled for replacements – propose change to independent heat pump.</li> </ol>
	2. Define objective of audits – electrification vs. efficiency.	In progress.	<ol> <li>Coordinate with TBS building study. –</li> <li>Forrest find out the need from Marie for what types of audits are needed to satisfy WWTP grant requirement.</li> <li>Open issue</li> <li>World Energy (also funded by National Grid) – walk through assessment of Public Safety and Town Hall planned for 12/5.</li> <li>Forrest arranged World Energy audit walkthrough of Town Hall (in Jan) and Public Safety building (complete – advocating for supplemental heat pumps). World Energy is focusing on reducing and not eliminating fossil fuel use.</li> </ol>

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3	Vehicles – Convert to Electric Vehicles	Lead: Peter	Support: Forrest
	Action	Status	Next Step
	1. Prepare Town Vehicle Inventory. Coordinate with NGRID Fleet Advisory program consultant.	Inventory complete. Report and implementation plan in process.	<ol> <li>Review Fleet Electrification report and recommendations. Review with Town Staff by Oct 2022. – Draft report being reviewed. The ICF study will be used as a reference. Remove this item.</li> <li>Discuss info gap about vehicle use, miles, lifecycle cost, etc.</li> <li>Forrest provided some additional info to the consultant. Final version of the Fleet report is received; Forrest to send out to HEAC for info by 10/13.</li> <li>Ford Hybrid Interceptor – wait until Feb</li> <li>CPIC – electric vehicle for future; wait until IRA incentives</li> <li>School \$15k electric vehicles – to replace existing COA vans; Ford E350 – replace existing vehicles for attrition. Replace CASE older vans. Typically have 2 consistently. Evaluate IRA option. Aligned with Fleet Electrification plans. CPIC will evaluate. Fully support.</li> <li>School Bus – new 3 year contract; keep aware of programs available for future electric options.</li> </ol>
	2. Identify candidates for replacement in short term.	Initially replacing police vehicles with Hybrids. Consider conversions to Hybrid of light or medium-duty vehicles.	Work with Tim Bragan and town staff to select vehicles. Plug in Hybrid retrofits available for medium duty trucks Peter requested Dept heads to identify vehicle replacement candidates. Initially Police and recently Fire Chief is interested in hybrid option.

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4	Vehicles – Charging Stations	Lead: Brian	Support: Peter
	1. Create Charger Plan for Town use on Town property.	Feasibility reviews performed by ECI. Charger are only partially funded if not public use.	<ul> <li>Focus on Public Safety Building.</li> <li>1. Obtain quote for Fast charger from ECI for police cruisers Brian ask ECI</li> <li>2. Determine if build-out (or any) will exceed electric supply?</li> </ul>
	2. Create Charger Plan for public use on Town property	Feasibility reviews performed by ECI. DC Fast chargers are only partially funded.	<ol> <li>ECI to process application to NGRID for certain locations. Focus on HES #2/TBS. Any data on usage?</li> <li>Brian to issue latest plan.</li> <li>HES #2 - more used by public. Concerned about the use by public. Concerned about time limits. Obtain HES use data.</li> <li>Bromfield Level 2 Charger in back priority. School committee suggest installing one charger at Bromfield.</li> </ol>

5	Green Community Program – Meet Obligations and Maximize Grants	Lead: Brian	Support: Forrest/David
	Action	Status	Next Step
	1. Prepare application w/MRPC and submit to DOER by Oct 3 for 2022 Block 2 Competitive grant.	Working on list of projects.	Library Weatherization Phase 2 and Vehicle Police Hybrid were the only 2 items on the application.
	2. Specialized MA Stretch Building Code –Adopt in 2023.	No work yet.	Determine path forward. Create plan by Dec 2022. Goal to bring to Town Meeting for Spring 2023. DOER issued revised Specialized Stretch Building Code for public comment. Focus is on net zero buildings. – On Hold
	3. Hire Municipal clean energy coordinator. (e.g., Sustainability Coordinator, Energy Manager)	No work yet.	Define role and plan by Jun 2023. Evaluate options – shared or dedicated Ellen sent Draft Sustainability Job Description sent to HEAC for review. – Description, Brian to review and plan to submit for Town budget; combine with a grant writer position. – On Hold due to budget concerns.

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6	Renewable Electricity – Solar Photovoltaic Systems	Lead: David	Support: Brian
	Action	Status	Next Step
	1. SB Green Initiative Goal 1) Utilize the capital fund for at least one solar PV project on a town-owned building	Two buildings identified - New COA (likely PPA) and Public Safety (likely direct purchase)	<ul> <li>COA; PBC working with Energy Sage as a PV system broker. Need a commitment from the Town. Working to determine the electric demand. IRA direct 30% ITC makes direct purchase more attractive.</li> <li>Public Safety – Determine Lead group. – Charles Oliver is putting in a capital request for this direct purchase.</li> <li>PV System on Public Safety building pending IRA incentives.</li> <li>David working on a conceptual strategy to be formalized.</li> <li>Reviewed Bromfield with Patrick Harrigan – new roof planned within 5 years. Canopies are not ideal. There have been concerns about some roof areas. Next Step – find out roof timing. Will need a study to evaluate concerns. SusanMary will review with School Committee.</li> <li>COA Building – HEAC position is to maximize solar installation. This conflicts with some on the PBC. Need a plan for excess.</li> <li>Solar PV Strategy – HEAC reviewed David's draft document and provided comments to be reviewed and formalized – see attached.</li> </ul>
	2. SB Green Initiative Goal 2) Meet with HEAC on the status of their investigation into a municipal solar panel field to generate revenues	Solect confirmed Stow Road gravel pit good for solar PV.	Obtain PPA proposal from Solect. – Pending Also part of Revenue Ideation committee. No update from Solect. David reviewing with Kara to highlight this project on the Revenue committee.
	3. Evaluate solar PV feasibility of remaining property. Hire 3 <sup>rd</sup> Party?	Informal evaluation of several sites done.	Discuss need for 3 <sup>rd</sup> party quote for Town evaluation. – Kara has list of possible sites. On Hold
	Battery Storage - Add to HES PV system and evaluate others; evaluate funding source.	No work yet.	<ol> <li>Establish project scope and owner. – Brian obtain assistance to justify project David identified the demand charges to be understood to justify the project (&gt;\$15/kW). Bill issue with actual readings and net metering credits still being resolved</li> </ol>

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			with NGRID.
7	Renewable Electricity – Energy Supply	Lead: Ellen	Support: David
	Action	Status	Next Step
	1. Town Procurement finalize 100% renewable supply as default option starting Nov 2022.	Town selected one year term expires Nov 2023.	DOER Climate Leaders program specifies 100% Class 1 Renewable option. Include for renewal in Q3 2023.
	2. Support rollout of new electricity supply program.	HEAC ready to support.	Ellen reviewed communication from Colonial. Meeting at COA on 10/6. Press Release in review. One year contract to be signed at 26/13 cents 6 months each. – CCA mailer sent out to all residents on the program. Session at the COA with Colonial Energy. Article in the Press.
	Net Metering Credit Purchase Agreements	Multiple offers (3) have been received due to the number of recent interconnection of dormant projects. Std Offer is 10%; 20 year contracts.	<ol> <li>Existing Athol array \$75k at 20% discount.</li> <li>Advise Town Procurement on a max NMC appetite \$300k (~kWh). Max credits shall be less than the total electric consumption. Negotiate more than 10% which is \$30k of the \$300k. Prefer a company that we have experience Oak Partners. The above recommendation will be provided by David Fay to Marie Sobalvarro to meet with the available companies. Require a cancellation clause. Voted 4-0 to make the above recommendation. – On Hold pending Select Board endorsement of Solar PV Strategy.</li> </ol>
8	Streetlights – Replace with LED Fixtures	David	Brian
	Action	Status	Next Step
	2. Review with Historical Commission	Completed Jan-Mar 2022; Requested warmer light	Need final approval
	3. NGRID install warmer light test fixture	Installed in wrong location	NGRID to replace with lower watt fixture in original location. Escalated @ NGRID 8/30; 9/14 request submitted internally at NGRID to perform the work and is being escalated. In NGRID queue to replace the test lamp. 12/14 – work order for expedited fixture replacement in process per NGRID.

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Membership	No update.	
	Meeting adjourned 9:45 pm (voted 5-0).	
Future Meetings	2023: Jan 11, Feb 8, Mar 8 HEAC Meeting Location/Time: 8 pm. – Virtual until further notice	

Other Items

- 1. WWTP leach field PV system. Tighe and Bond David to ask Tim Bragan why it is a good application for solar PV.
- 2. HES Electric Bill Reconciliation David working with NGRID to obtain answers.

[This is a draft of a solar strategy proposal that I would like submit to the Select Board for their consideration. It is a working draft and I expect to revise it before going to the SB. But I'd like to get reactions now from HEAC so I can find out if I'm heading in the right direction. All comments are welcome even if you think this draft is completely misguided.]

Several people have observed that Harvard should not be picking buildings to solarize based on advocacy -- that is, selecting a building to solarize because a local resident or town official thinks, for whatever reason, it would be a good idea. Rather, the town should have an overarching solar strategy that should inform its decisions. That strategy should, above all, be guided by what Harvard is trying to achieve with solarization.

In this note, I'll try to lay out some solar strategies for Harvard, based on what I perceive to be Harvard's solarization goals. In particular, I will propose four different strategies for the town to choose from that differ in the tradeoffs between financial benefit, effort, and probability of success.

One of the main differences among solar strategies is in their financial benefit to the town. It may surprise some to learn that solarizing a town building can save the town money. It does this by lowering the cost the town pays per kilowatt-hour of electricity. Solar electricity, it turns out, can be much less expensive than electricity purchased from an electric utility (National Grid in our case), so solarizing can potentially save the town some money. How much it saves depends on which particular solar strategy the town pursues.

To see how this works consider the following graph of how much electricity costs Harvard per kilowatt-hour from different sources: **Commented [BS1]:** Purpose of the document is to provide guidance on solar PV projects to the Select Board and Town Administration as well as other Town committees.

**Commented [BS2]:** Identify the budget allocation for the town to offset with PV projects. Identify a priority of projects to focus for the near term.

**Commented [BS3]:** Identify direct energy as muni supply and green up as 100% renewable



The left-most bar, labeled "National Grid Basic Service", is what Harvard would pay if it signed up for National Grid's Basic Service. Basic Service supplies electricity that National Grid purchases on the open market using the enormous size of its purchase to get good prices. Basic Service electricity would cost Harvard about 22 cents per kWh. It serves as a baseline against which all other options can be compared.

The next bar to the right is what Harvard would pay National Grid if it wanted its electricity to come from all renewable sources -- the so-called GreenUp option that National Grid offers. Relatively few people purchase GreenUp so its electricity is a specialty product that is more expensive than Basic Service electricity. It costs more than 25 cents per kWh.

**Commented [BS4]:** For Greenup and Direct - add to label that it is 100% renewable

The next bar to the right, labeled "National Grid Competitive Supply (Direct Energy)" is what the town paid in FY2022 under a contract with the competitive supplier Direct Energy. Electricity in this very competitive market tends to be lower in price than Basic Supply even though the quantity being purchased is much smaller. Under the Direct Energy contract, Harvard saves about 2 cents per kWh but it is buying electricity produced mainly from fossil fuels.

The next bar to the right, labeled "Athol Solar NMC", is the cost per kilowatt-hour we paid in FY2022 for electricity generated by a solar facility built by a third party in Athol, MA. This is the so-called Net Metering Credit contract that HEAC negotiated in 2017. It allows the town to purchase completely renewable electricity at (roughly) a 20% discount from what we would pay. About 20% of Harvard's electricity is purchased under this contract; it costs the town around 16 cents per kWh.

The next bar, labeled "Hildreth Solar PPA", is what the town paid in FY2022, and will pay for the next 20 years, for electricity generated by the solar array on the roof of the new Hildreth Elementary School. This array was paid for and is owned by Solect Energy. As the graph shows, electricity purchased through this so-called Power Purchase Agreement (PPA) costs the town about 9 cents per kilowatt-hour. Note that this is the total cost of that electricity to the town, not just the supply portion.

Finally, the right-most bar, labeled "Self-owned Solar", shows the estimated cost of electricity from a solar array built and owned by the town, as has been proposed, for example, for the new Council on Aging building. The estimate is based on a residential solar installation, so it's not a perfect model for a town-owned array, but it does include the cost to build the array. This is the cheapest source of electricity available to the town at about 5 cents per kWh.

What this chart shows is that, of all the options available to it, both renewable and nonrenewable, Harvard could save the most money by building its own solar array. This is true even when one takes into account what it costs to build the solar array (the socalled Levelized Cost of Electricity). Any other way of buying electricity (e.g., an NMC contract, a PPA, or purchase from a utility) is more expensive.

Our first conclusion then is that if all we consider is saving the town money on its electricity bills, the best solar strategy for the town is to build its own solar arrays. There are two ways to accomplish this. One option is to build rooftop solar -- that is, to put an array on any town building that has a suitable rooftop, considering size, solar orientation, age of roof shingles, and so on. The second option is to put solar on the ground -- a so-called ground-mount array.

It might seem strange but these self-owned options lead to different solar strategies. One reason is location. Rooftop solar on town buildings is a fairly uncontroversial path because rooftop solar is so common these days. The only exception to this is in Harvard's Town Center Historical District, where solar installations may conflict with historical preservation goals, as enforced by the Historical Commission.

**Commented [BS5]:** There are concerns for some rooftop installation due to available space, maintenance, structural, roof warranty, etc. Also consider canopies.

Ground-mount solar arrays, on the other hand, can be controversial, especially if they are located near houses. People living nearby can be concerned about aesthetics, property values, safety, and so forth. A ground-mount array in Harvard might also require a zoning change since, at present, ground-mount solar arrays are allowed in only two spots in town: the capped land-fill at the Transfer Station, and the location of the Community Solar array on Ayer Road.

Another difference between roof-mount and ground-mount self-owned arrays is the problem of connecting to the electrical grid. Any solar array has to get permission from National Grid to connect it to the grid. This permission can be routine, as for relatively small residential solar arrays, or it can be difficult and expensive, if it requires upgrades to the grid infrastructure. The larger the array, the more likely that grid changes will be needed.

Roof-mount arrays on town buildings would be considered small or medium in size, so they would not be expected to trigger grid upgrades, although the array on Hildreth was initially rejected by National Grid for just this reason. However, ground-mount arrays, especially a large one that would cover all the electricity needs of town buildings, could very well require a grid upgrade. This could slow a project down, cost a lot of money (solar developers typically have to pay for grid upgrades), or even kill it.

Putting all of this information together, we see four different solar strategies for Harvard: (a) Self-owned Ground-Mount; (b) Self-owned Roof-tops; (c) PPAs (like Hildreth Elementary); or (d) Net Metering Credit contracts. How might we decide which is the most attractive strategy?

If all we considered was cost of electricity, we would pick (a) or (b) because they would generate the most savings for Harvard (as the discussion of cost of electricity showed). If we consider ease-of-implementation, we would likely pick a single large ground-mount project over multiple roof-top projects. With a large enough site for ground-mount, the town could solarize all of its electricity use in one fell swoop and save the most money.

While roof-top arrays are an attractive option, they do have a lot of overhead in planning and implementing multiple small projects. Furthermore, it's not clear without further study whether there is enough buildable roof space for roof-top solar arrays to provide enough solar electricity to cover all of the town's electricity needs.

But cost is not the only consideration. We need to acknowledge that a large groundmount array is bound to be controversial, particularly if it is near houses. It is impossible to predict, however, how much of an impediment this would be -- it would depend critically on the particular site and the amount of opposition.

A PPA would provide substantial savings to the town although not nearly as much as options (a) and (b). Another drawback is that there is only one site in town that would likely be attractive to PPA developers: Bromfield School. Bromfield has space on its roof

for a large array, but it's not clear it would produce enough electricity to meet all of the town's needs.

The fourth strategy, Net Metering Credits, is appealingly simple. NMC developers have already approached Harvard with offers to solarize all of Harvard's electricity usage. If the town were only interested in reducing its carbon emissions, a large NMC contract would be the most attractive path since only one contract needs to be negotiated for 20 years of carbon-free electricity.

The problem with NMC contracts is that they don't save the town much money (10% based on current offers).

Summarizing, the choice among strategies comes down to risk versus reward, where risk is measured in effort, hassle, and probability of success while reward is measured in financial benefit to the town. Low-risk strategies like NMCs bring very modest reward to the town. High risk stategies like self-owned arrays bring the highest reward to the town.

Just to make this salient, consider how much the town would save if it obtained all of its electricity from self-owned arrays. This would deliver about a 75% reduction in what the town pays currently for electricity (but only for the part that is not already renewable due to NMCs or PPAs). The savings would amount to about \$170K per year and more after the array is paid for. If the town were to electrify all its buildings and vehicles to eliminate fossil fuel use, the savings would be much greater.

This note has outlined, in broad strokes, the considerations in picking a solar strategy. The next step would be to pick one of the four strategies to explore in more detail -- for example, what locations for self-owned ground-mount arrays actually exist, whether they elicit popular opposition, and whether interconnection to the grid is problematic. It might well be that the most attractive strategy at the broad-brush level turns out after study not to be feasible. In that case, we would need to re-consider strategies and engage in detailed study of another approach.

David Harvard Energy Advisory Committee **Commented [BS6]:** Why do we need to meet all of our needs with one project? Also note that the grid supply will likely be 100% renewable in the next Muni supply contract or the entire grid evenually.

**Commented [BS7]:** This point should be explained in more detail - the basis for the budget allocation. (by the way why can't you product excess power and sell back to the grid and that would not impact the budget?)

**Commented [BS8]:** Refer to the SB goals for 2023 that require solar PV projects, refer that this strategy is needed to execute on the HCIC Climate Plan Energy Goal and the Revenue Ideation goals

**Commented [BS9]:** Add Phase 2 next steps; identify examples; evaluate inventory of sites, establish priority